

**REMARKS****Status of the Claims**

Claims 1 – 31 are pending in the application. Claims 1 – 28 stand rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 29 – 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Geometric Invariants for Rational Polynomial Cameras, by Barrett et al., IEEE 0-7695-0978-9/00 (“Barrett”). The Applicants submit that these claims, as amended, properly define patentable subject matter and respectfully request that all pending claims be allowed to pass to issue.

The Applicants thank the Examiner for the indication made in the last Office Action that claims 1 – 28 would be allowable but for noted phrases and a referencing error. Accordingly, claims 1, 14, and 16, have been amended for readability and grammatical style. These claims have not been amended for substance or for reasons of patentability. Claims 2 – 13, 15, 17, and 20 – 28 all depend either directly or indirectly from one of these claims and have not been amended. Applicants believe that claims 1 – 28 are in condition to be allowed.

Claims 19 and 21 have been amended to correct typographical errors. Claim 29 has been amended to make certain features explicit that were implicitly included in the claim as originally submitted. Applicants reserve all rights to all equivalents of elements and limitations of inventions described in any claims subsequently allowed in this or other applications.

The Applicants respectfully traverse these rejections on at least the grounds that the claims as amended properly define patentable subject matter in full compliance with the requirements of 35 U.S.C. § 112 second paragraph. Additionally, the Applicants submit that

claims 29 – 31 define patentable subject matter that is allowable over Barrett because the Examiner has failed to establish a prima facie case of obviousness.

## Arguments

### Section 112 Rejections

Claims 1 – 28 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The Applicants submit that these claims, as currently amended, are sufficiently definite to be allowable. “The perspective of a person of ordinary skill in the art at the time of the patent application governs the definiteness analysis.” Howmedica Osteonics Corp. v. Tranquil Prospects, Ltd., 401 F.3d 1367, 1371 (Fed. Cir. 2005) (citing W.L. Gore & Assocs., Inc. v. Garlock, Inc., 721 F.2d 1540, 1556-57 (Fed. Cir. 1983)). The definiteness of a patent claim depends on whether one skilled in the art would understand the bounds of the claim when read in light of the specification. Id. “[T]he person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” Phillips v. AWH Corp., 415 F.3d 1303, 1313 (Fed. Cir. 2005).

In this application, the Applicants submit that a person of ordinary skill in this art area would readily understand the meanings of the terms used in the claims. Given the perspective of a person of ordinary skill in this art area as well as the disclosures made in the specification, it cannot be said that the legal scope of the claims is so unclear as to prevent a person of ordinary skill from determining whether a particular product or method infringes. See Howmedica, 401 F.3d at 1371. Moreover, claims 1-28 have been amended to address the drafting concerns of the Examiner. For at least these reasons, claims 1 – 28 are allowable. Consequently, the Applicants respectfully request that the indefiniteness rejections of these claims be withdrawn and that these claims be allowed to issue.

Section 103(a) Rejections

Claims 29 – 31 stand rejected pursuant to 35 U.S.C. § 103(a) as unpatentable over Barrett. No secondary reference is provided and no Official Notice of any facts has been taken. The Applicants respectfully submit that in such a circumstance, the Examiner cannot establish a prima facie case of obviousness as a matter of law. Even if possible to establish a prima facie case based on a single reference, in this instance, the Applicants respectfully submit that the Examiner has failed to so do. Specifically, the Applicants submit that the Examiner’s mere assertion that claimed methods, including those concerning height among others, would have been obvious is insufficient to establish a prima facie case. Consequently, the Applicants submit that claims 29 – 31 properly define patentable subject matter and should be allowed to pass to issue.

The Supreme Court of the United States recently reaffirmed that an objective analysis is necessary to determine whether a claimed invention would have been obvious at the time it was made to a person having ordinary skill in the art to which the subject matter pertains. See KSR Int’l Co. v. Teleflex Inc., \_\_\_\_ U.S. \_\_\_\_ , 127 S. Ct. 1727, 1734 (2007). “Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or nonobviousness of the subject matter is determined.” Id. (quoting Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 17-18 (1966)). To facilitate review, the Supreme Court has stated that the required analysis be made explicit. Id. at 1741. “Rejections on obviousness grounds cannot be sustained with mere conclusory statements; instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” Id. (quoting In re Kahn, 441 F.3d 977, 988 (Fed. Cir. 2006)).

An applicant for a patent is entitled to have a patent grant from an application if, in the absence of other bases for rejecting the application, an Examiner cannot produce a prima facie case of unpatentability. In re Oetiker, 977 F.2d 1443, 1444 (Fed. Cir. 1992). When more than one reference is required to establish a proper obviousness rejection, “[the Examiner] can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.” In re Fritch, 972 F.2d 1260 (Fed. Cir. 1992) (citing In re Fine, 837 F.2d 1071, 1074). The Examiner must also show why it would appear that the references would have been combined. In re Fine, 837 F.2d at 1074.

Obviousness determinations under Section 103 require that the claimed invention be evaluated as a whole. As explained by the Federal Circuit,

[w]ithout this important requirement, an obviousness assessment might break an invention into its component parts (A + B + C), then find a prior art reference containing A, another containing B, and another containing C, and on that basis alone declare the invention obvious. Section 103 precludes this hindsight discounting of the value of new combinations by requiring an assessment of the invention as a whole.

Panduit Corp. v. Dennison Mfg. Co., 1 USPQ2d 1593, 1595-96 (Fed. Cir.), cert. denied, 481 U.S. 1052 (1987).

It is inappropriate for an Examiner to merely make conclusory statements regarding obviousness without supporting references. See MPEP § 2144.03 (discussing the propriety of Official Notice). Specific knowledge of the prior art must always be supported by citation to some reference work recognized as standard in the pertinent art. Id. (citing In re Ahlert, 424 F.2d at 1091). It is never appropriate to rely solely on “common knowledge” in the art without evidentiary support in the record, as the principal evidence upon which a rejection was based.

Id. For at least these reasons, this rejection should be withdrawn.

In the current application, the Examiner expressly admitted that Barrett does not disclose a method for generating height information as claimed in the current application: “[H]e fails to explicitly disclose generating the height information as claimed in the claims.” This admission, coupled with the fact that no other references are cited, demonstrates that the claimed subject matter is not obvious and should be allowed to pass to issue.

Despite this crucial admission of the failure of Barret to disclose claimed limitations, the Examiner makes an unsupported claim regarding obviousness. In the Office Action, the Examiner stated, “But, as shown in Figure 1 [of Barrett], the Z is the third axis as the height of the object. Therefore, it would have been obvious to one ordinarily skilled in the art at the time of the invention to simply utilize the teaching of Barrett, to consider the height information derivation in order to locate the object in space.” [Office Action at ¶ 5].

Deficiencies in the disclosure of Barrett are not cured by any secondary reference. Moreover, the Examiner failed to acknowledge key teachings of the method described in Barrett. At page 226, it is explained in Barrett that the method disclosed in Barrett works only when height is not considered. At page 226, it is expressly admitted that in “this paper we further restrict the study to images of the plane ( $z = 0$ ), developing in the 2-D case techniques. . . .” Thus, the method described in Barrett is limited to a single two dimensional plane, specifically, the plane  $z=0$ . In other words, not only is height not considered, it is completely eliminated from consideration.

Furthermore, it is easily demonstrated that certain factual contentions in the Office Action [at ¶ 5] as to what Barrett discloses are incorrect. It appears that the Examiner has misconstrued Barrett. The Examiner states that Barrett discloses “generating a version of

rectified image that includes the height information (see page 225 last half to page 226 second column), as claimed.” It is relevant to note though that claims 29 – 31 of the current application concern a method that utilizes rational polynomial coefficients (RPCs). Conversely, the methods described on the last half of page 225 to page 226 (second column) of Barrett concern an entirely different method, a method that utilizes linear fractional models instead of RPCs. There is no secondary reference to support a conclusion that it would have been obvious to one ordinarily skilled at the time of the invention to take the methods from linear fractional models and apply them to RPC models. Also, there is no secondary reference to indicate that this even would have been possible or even would have worked, if at all possible.

Moreover, claim 29 of the present application and the claims that depend from it (claims 30 and 31) concern a computerized method for generating height information from arbitrary image point on a rectified image. Specifically, the claimed method comprises “deriving the height information from first and second aerial images having respective first and second sets of rational polynomial coefficients (RPCs), by intersecting a first RPC line of the first aerial image with a first epipolar line of the first aerial image and a second RPC line of the second aerial image with a second epipolar line of the second aerial image, wherein the first and second aerial images and the rectified image include overlapping image locations.” Barrett does not disclose any method for deriving height information, let alone any method concerning a first RPC line of a first aerial image with a first epipolar line of the first aerial image intersecting with a second RPC line of a second aerial image with a second epipolar line of the second aerial image in order to address height. Actually, Barrett does not concern any method whatsoever of deriving height information with RPCs. As indicated above, the RPC method described in Barrett is limited to

analysis that restricts  $z$  to 0, or in other words, a single two-dimensional plane that does not analyze or address height information.

In summary, Barrett discloses two methods:

- (1) a method utilizing linear fractional models (at pp. 225-226); and
- (2) a limited method utilizing RPCs that is restricted in use to situations where height is not addressed (pp. 226-227).

The current application concerns a separate and distinct third method that is not disclosed in Barrett:

- (3) a method that utilizes RPCs and can address height information (is not restricted to an analysis wherein  $z = 0$ ).

As such, the methods set forth in claims 29 - 31 of the current application are patentable over Barrett. Notably, Barrett does not disclose any method, technology or advancement that would enable the disclosed methods to be expanded to include situations where height is considered -- when  $z$  is not restricted to equal 0.

The concluding remarks of Barrett establish that the methods set forth in Barrett are limited to two dimensional east/west, north/south planar scenes that do not address height and they are not capable of handling height analysis:

### **3. Conclusions and future directions**

The long-range objective of this research is to extend the theory of geometric invariants beyond linear fractional camera models to RPC camera models of higher degree. We have initially restricted our investigation to quadratic fractional cameras imaging **planar scenes**, enabling projective geometry to guide our derivations of reconstruction and transfer invariants. The theory is illustrated with examples of applications to remote sensing (IKONOS) imagery. These initial results highlight the potential importance of extending Steiner's Theorems to multiple pencils of conic curves and surfaces, further developing our

invariants theory for higher-degree fractional cameras. [Emphasis added]

(Barrett, p. 234). The inventions set forth in claims 29- 21 of the current application exceed these “initial results” of Barrett with a separate and distinct method capable of handling analysis that encompasses height considerations -- capable of addressing more than planar scenes. This is done using claimed RPC methods not disclosed in Barrett. It is relevant to note that:

- (1) the computational RPC methodology in claims 29 - 31 of the current application is not the same as the methodology in Barrett; and
- (2) the methodology of claims 29 - 31 of the current application has greater capabilities than those disclosed in Barrett -- namely the capability to address three dimensional analysis considering height.

This methodology of claims 29 - 31 of the current application which is different than and more diverse than the inventions disclosed in Barrett is patentable.

For at least these reasons, the Examiner has failed to establish a *prima facie* case of obviousness and the Applicants respectfully request that the obviousness rejections be withdrawn. Should the Examiner present new rejections based on newly discovered art in the next Office Action, the Applicants submit that they have made no claim amendments that would necessitate a new search and therefore should be granted another opportunity to meet any new rejection in response to a non-final office action.

**Conclusion**

This application is believed to be in condition for allowance in view of the above comments and the Applicants request that all pending claims be allowed to pass to issue. To the extent that the Examiner believes that an interview would assist in the continued prosecution of the application, the Applicants respectfully request that the Examiner contact the attorney at his telephone number below to schedule an interview. In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees, or credit any overpayments, to Deposit Account No. 50-1884.

Respectfully submitted,  
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